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Nebraska NativeGEM (Geospatial Extension Model)

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et al.

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(a) Introduction

Through NASA funding in August 2002, the NASA Nebraska Space Grant Consortium (NNSGC) hired Karisa Vasek as Nebraska's full-time Geospatial Extension Specialist (GES). Nebraska's GES joins the missions of the NASA Office of Earth Science and NASA Space Grant with the U.S. Department of Agriculture, realizing within Nebraska the goal to implement a GES. Due to the state's strategic use of NASA and state funding in the past 12 years, there was considerable capacity in place in Nebraska to intensify geospatial research, education, and outreach efforts. The NNSGC partners with Land Grant; Cooperative Extension; the University of Nebraska - Lincoln (UNL) Center for Advanced Land Management Information Technologies (CALMIT); and remote sensing faculty at Creighton and the University of Nebraska at Omaha (UNO). It also includes emerging collaborations with Minnesota Sea Grant, the Nebraska Geographic Information Systems (GIS) Steering Committee, The Nebraska Implementation (I)-Team, NE GIS/LIS (land information systems) Association, and numerous geospatial industry and governmental partners (Vasek & Bowen, 2004). The NASA Nebraska Space Grant & EPSCoR program is located within the Aviation Department at UNO where the GES is also housed.

This proposal, Nebraska NativeGEM (Geospatial Extension Model) features a unique diversity component stemming from the exceptional reputation NNSGC has built by delivering geospatial science experiences to Nebraska's Native Americans. For 7 years, NNSGC has partnered with the 2 tribal colleges and 4 reservation school districts in Nebraska to form the Nebraska Native American Outreach Program (NNAOP), a partnership among tribal community leaders, academia, tribal schools, and industry reaching close to 1,000 Native American youth, and over 1,200 community members (Lehrer & Zendajas, 2001).

One of the most innovative initiatives of the NNSGC was the creation of Native IMAGE (Institute for Managing Applications in Geospatial Extension) in January 2003. This center of excellence was founded at Little Priest Tribal College (LPTC) in Winnebago, NE. Native IMAGE is funded by the NNSGC program and the GES is deeply involved in the geospatial activities with the institute (Vasek, Lehrer, Bowen, & Nickerson, 2004). The center serves as a conduit by which all Native American geospatial activities are delivered. Native IMAGE coordinates geospatial outreach activities, training sessions, provides internship opportunities, acts as a resource to tribal governments, works with faculty at tribal colleges and schools to integrate geospatial technologies into current curriculum, collaborates with the USDA-funded extension agent, provides training to other tribal entities, as well as numerous other activities. In addition, Native IMAGE through LPTC is a founding member of the United States Geologic Survey (USGS) NativeView project (NativeView, n.d.). The creation of Native IMAGE provides the framework and foundation upon which the activities of this proposal can greatly enhance.

NativeGEM addresses all three key components of Cooperative State Research, Education, and Extension Service (CSREES) goals for advancing decision support, education, and workforce development through the GES. The existing long term commitments that the NNSGC and the GES have in these areas allow for the pursuit of a broad range of activities. NativeGEM builds upon these existing successful programs and collaborations. Outcomes and metrics for each proposed project are detailed in the "Approach" section of this document.

Goal 1: Improve, through the use of geospatial information, the decision support systems of users at local, county, and state levels.

- 1.1: Data Collection by Partnering with Land Grant
- 1.2: Assisting Tribal Communities with Decision Support
- 1.3: Geospatial Data Center Enhancements

Goal 2: Improve education in remote sensing and related geospatial technology at the local, county, and state levels.

- 2.1: Geospatial Family Science Programs
- 2.2: Geospatial Curriculum Development
- 2.3: Thurston County Geospatial Concept

Goal 3: Promote development of a workforce skilled in the use of geospatial technology and integrated with the staffs of user organizations.

- 3.1: Native American Internship Opportunities
- 3.2: Geospatial Workshops
- 3.3: Non-credit Certificate Program
- 3.4: Nebraska Science Fairs

(b) Relevance and Significance

Goal 1: Improve, through the use of geospatial information, the decision support systems of users at local, county and state levels.

Data Collection by Partnering with Land Grant: Nebraska's GES has successfully partnered with CALMIT on several airborne remote sensing missions of the Winnebago and Santee Sioux Reservations. NativeGEM will continue this partnership and allow for the collection of additional imagery and data for tribal communities in Nebraska. This partnership allows access to an innovative hyperspectral instrument called the airborne imaging spectrometer (AISA). In this capacity, the GES is ideally situated to broker access to this imagery, research data, and results to the Winnebago tribal council, planning department, community, schools, and Little Priest Tribal College (LPTC). The GES will also facilitate tribal access to the CALMIT website which contains a map and imager server of geospatial data pertaining to Nebraska.

Assisting Tribal Communities with Decision Support: The citizens of Nebraska face many environmental and social challenges that can be addressed with the help of geospatial technologies. Nebraska's GES is bringing expertise and training to users for help in addressing these needs. The cooperation with Land Grant and Cooperative Extension continues to benefit many Nebraskans. Decision support systems are being developed for utilization by tribal leaders in Nebraska and accessed by students at Geospatial Data Centers located at community and tribal Land Grant colleges.

Geospatial Data Center Enhancements: Geospatial data centers are currently operating at LPTC, Nebraska Indian Community College (NICC), and UNO. Remote sensing software programs are needed at the two tribal college data centers, as they currently have no access to these decision support tools.

Goal 2: Improve education in remote sensing and related geospatial technology at the local, county and state levels.

Geospatial Family Science Programs: The highly successful Family Aeronautical Science program will be expanded to include geospatial activities. This program focuses on junior high

and high school students will be a major focus in improving geospatial education. The GES will also work with tribal school teachers to develop lesson plans for the program.

Geospatial Curriculum Development: NativeGEM's geospatial curriculum efforts will include developing 2+2 relationships with 4-year institutions (Wayne State, UNO, UNL, and South Dakota State). Funding will also ensure free distribution of DataSlate, educational software for teaching the basics of remote sensing, GIS, and the global positioning system (GPS). A web-based presence for the national Lewis and Clark Bicentennial celebration using NASA-related geospatial data will also be supported.

Thurston County Geospatial Concept: NativeGEM will build on NNSGC's established relationships in Thurston County with tribal schools, colleges, and the community. The GES will work with educators to integrate geospatial science technologies in their classrooms. If NativeGEM is funded, the GES will work with Thurston County Extension agents to implement a 4-H program with a focus on geospatial technologies. Currently, there is not a 4-H club in Thurston County and the GES has already begun preliminary collaborations with extension agents and personnel at Native IMAGE to introduce this program. Additional geospatial workshops will also be funded for Thurston County.

Goal 3: Promote development of a workforce skilled in the use of geospatial technology and integrated with the staffs of user organizations.

Native American Internship Opportunities: NativeGEM will build upon the Native American internships already existing within Native IMAGE, expanding opportunities to within the Winnebago Tribal Government. Two students from LPTC will assist their own tribe by collecting GPS data points for items such as wells, feed lots, highways, and grain elevators.

Geospatial Workshops: The GES will continue to enhance geospatial training with tribal communities in Nebraska. The tribal governments have expressed a strong desire to learn as much as they can about utilizing geospatial technologies to make informed decisions. Workshops will allow the GES to provide additional training which promotes workforce development.

Non-credit Certificate Program: Currently, Nebraska does not have any type of non-credit training in geospatial technologies. This proposal will build on the NNSGC Workforce Development Proposal to initiate a non-credit certificate program for Nebraska. The GES will collaborate with CALMIT, LPTC, and Minnesota Sea Grant to develop a program to fill this void. Training materials from the GES-led workshops will be developed into modules that will be available on-line.

Nebraska Science Fairs: Through NativeGEM the GES will continue to highlight geosciences at the Nebraska Science and Technology Recruitment Fair, the Annual Native Schools Fair, and the Women in Science Fair.

(c) Approach

Goal 1: Improve, through the use of geospatial information, the decision support systems of users at local, county and state levels.

Projected Outcomes: GES coordinates overflight missions of the Winnebago Reservation; GES links Winnebago Tribe to CALMIT website and data; data and imagery from overflights

archived on all Nebraska Geospatial Data Centers; remote sensing software installed on Winnebago and Santee Reservations Data Centers; GES works with Winnebago Tribe to facilitate Decision Support; GES fosters link between tribes and Nebraska Agricultural Decision Support System; GES-led seminars and training activities; GES-County Extension Agents collaborations; outcome/metrics review by Technical Advisory Committee; presentation of research at state, regional and national conferences.

Metrics for Performance Indicator 1.1: Data Collection by Partnering with Land Grant

Utilizing a partnership with Land Grant, the GES was able to coordinate several remote sensing overflight missions of the Winnebago and Santee Sioux Reservations. Under the partnership of an NSF grant, a unique collaboration was formed. NNSGC and EPScoR and UNL's CALMIT operate the Nebraska Remote Sensing Program. The collaboration between the National Science Foundation (NSF)-funded airplane and the NASA-funded instrumentation, which reside at CALMIT, and the NNSGC operation of the airplane was cited as one of the best examples of a partnership by NSF (Harrington, 2003). The airborne platform supports the following sensors and instrumentation:

- Kodak DCS-420 color infrared digital camera
- Analytical Spectral Devices (ASD) spectroradiometer operating in the 350-2500nm wavelength range
- NASA Goddard Space Flight Center provided and refurbished Airborne Laser Polarimeter System (ALPS) operating at 532 and 1064nm wavelengths
- UNL developed noise radar scatterometer operating at 1.275 GHz (L-band) and 10 GHz (X-band) frequencies
- Canon 2500 digital video camera
- Airborne Imaging Spectrometer (AISA) operating in the 400-900nm wavelength range
- Preliminary work on the construction of a multi-wave lidar (light detection and ranging) system
- Synthetic Aperture Radar (SAR) currently being tested
- Interferometric SAR (inSAR) under development
- Laser fluorescence sensor under development

In 2002 and 2003, the GES utilized the color infrared camera and the hyperspectral AISA sensor for overflight missions of the Winnebago and Santee Sioux Reservations. The AISA sensor is calibrated at NASA Stennis Space Center and is one of only a few currently operating in the United States (Narayanan, Bowen, & Nickerson, 2002). The AISA mission resulted in 35 bands of data of the Winnebago Reservation. The hyperspectral data targeted two bison pastures on the Reservation. NativeGEM will continue the successful collaboration between the GES and Land Grant. The GES will consult with the Winnebago Tribe and plan additional overflight missions of the Reservation. The data and imagery will be passed through Native IMAGE. Imagery, research data, and results will be made available through Native IMAGE to the Winnebago tribal council, planning department, community, schools, and LPTC. In addition to agricultural implications, this information will impact economic, social, and cultural issues.

NativeGEM will also link tribal communities to the CALMIT website. The website has an ArcIMS server which allows for easy access and downloading of geospatial information. This website will be a critical tool for decision support systems on the reservations.

Metrics for Performance Indicator 1.2: Assisting Tribal Communities with Decision Support

A needs analysis was conducted on the Winnebago Reservation in 2003 (Vlasek, Lehrer, & Bowen, 2004). Identified stakeholders included the Winnebago Environmental Protection Agency (EPA) Water Quality Specialist, Winnebago GPS/GIS Specialist, Construction Manager, Tribal Planning Department, Land Management Department, faculty from LPTC, and teachers from Winnebago Public Schools. Several meetings have been conducted with end-users to outline the needs on the reservation. The greatest need involved locating and mapping of many of the reservation resources including the mapping of all:

- roadways
- unpaved roads
- water resources
- animal feed lots
- railroads
- utilities
- pesticides
- water wells
- abandoned wells

It was determined at the stakeholder meetings that the desire to utilize geospatial technologies was high, but the tribe lacked the training and skills to accomplish inventory mapping. The GES will foster training opportunities for the tribe in GPS, remote sensing, and GIS. In addition, resources will be leveraged from a partnership with CALMIT to utilize the airborne remote sensing platform to collect imagery and data. The GES will facilitate access to the imagery and data collected by past overflights of the Winnebago Reservation using the AISA calibrated by NASA Stennis, ensuring comprehensive application of this vital asset to the people of Winnebago.

Many more needs were identified including monitoring commercial development, industrial growth, farmland and grazing land preservation, housing planning, impervious surface expansion, waterway and wetland conservation, and environmental protection. The GES will continue to work with the end-users to define the project goals and applications.

The GES will also begin to foster the link between tribal communities and the Nebraska Agricultural Decision Support System. This program brings together researchers from UNL, UNO, High Plains Regional Climate Center, the National Drought Mitigation Center, and the Center for Rural Affairs with funding provided by USDA, NSF, NOAA. This program targets decision-makers that are confronted daily with a host of pressing social, economic, and environmental problems that are increasingly complex. These decision-makers are facing important, complex problems involving spatial information require tools for:

- identifying relevant information, models, and methods
- extracting meaningful information from image sets
- retrieving spatial data subject to application constraints
- creating and updating knowledge for high-level decisions

The link between tribal communities and the Nebraska Agricultural Decision Support Systems has not been made and the GES will provide this connection (Nebraska Agricultural Decision Support Systems, 2004). This program offers a variety of decision support tools to users such as drought indices, planting guides, precipitation indices, and a variety of other support tools.

Metrics for Performance Indicator 1.3: Geospatial Data Center Enhancements

The NEGEP has placed data centers across the state of Nebraska. Two data centers are in place at LPTC on the Winnebago Reservation and one at NICC on the Santee Sioux Reservation. Currently, these computer workstations consist of ESRI's ArcGIS software. Building upon these existing resources, NativeGEM will add remote sensing software to these workstations to be utilized for decision support. Neither tribe currently has any remote sensing software programs, nor do they have access to this software at a location nearby. These programs will allow data and imagery from the overflights to be used. All geospatial data centers across Nebraska will archive overflight imagery and data.

Goal 2: Improve education in remote sensing and related geospatial technology at the local, county and state levels.

Projected Outcomes: GES collaboration with educators on training and curriculum development; Family Geospatial Science Program curriculum expansion; build upon the developing non-credit certificate in geospatial technologies; 2+2 relationships with 4-year institutions; free distribution of DataSlate software and teacher guides; continued expansion of Nebraska Geospatial Extension Program website; workshops for educators and extension agents; collaboration on Lewis and Clark website project; collaboration of 4-H program with an emphasis in geospatial technologies in Thurston County; nationwide GES collaborations for conducting regional training seminars and sharing resources and training materials.

Metrics for Performance Indicator 2.1: Geospatial Family Science

The NNAOP endeavor has earned praise from NASA researchers for its efforts to extend science education and technology to underrepresented and underserved populations. Dr. Thomas Pinelli of NASA Langley assisted in the vision of this program. NativeGEM is building on the highly successful foundation of the Family Aeronautical Science Program. The NNSGC and EPSCoR Programs at UNO have embarked on a unique educational journey. This journey, known as the NNAOP, has been a highly successful endeavor since its inception in 1997. The NNAOP's main objective is to make Nebraska's Native American students more competitive in mathematics and science. This program is the most comprehensive Native American program of any state and has allowed for a variety of activities to take place including: regional and national presentations; interfacing between schools; and formulating administrative leadership conferences. The aeronautical curriculum consists of three years of lesson plans developed in cooperation with educators in the tribal schools.

The GES is already working in close partnership with several reservation teachers on lesson plans that incorporate geospatial elements including mapping, GPS, GIS, and remote sensing. Year one of the curriculum is currently being written, but years two and three are in need of development. NativeGEM will build on this highly successful model and expand the geospatial curriculum to years two and three. The data and imagery collected through the Nebraska Remote Sensing Facility of reservation lands in Nebraska will be used in the curriculum.

Metrics for Performance Indicator 2.2: Geospatial Curriculum Development

Data centers at LPTC and NICC provide computer workstations and geospatial software to students, faculty, and community members. Faculty members can utilize the software and

hardware at these workstations to further their training and integrate the technology into their classrooms.

The NNSGC is expanding the number of K-16 geospatial-related educational offerings by collaborating with Blanche Meeson at Goddard Space Flight Center and Ramona Travis at Stennis Space Flight Center. The NNSGC is currently developing 2+2 relationships with four-year institutions (Wayne State, UNO, UNL, and South Dakota State). Ultimately the science, technology, engineering, and mathematics (STEM) workforce pipeline will grow when students from LPTC and NICC transfer to a four-year institution for degrees in the geosciences. Blanche Meeson at Goddard Space Flight Center and Ramona Travis at Stennis Space Flight Center have been briefed frequently on the progress of this program.

UNO, the NNSGC Lead Institution, recently received exclusive license to distribute and maintain DataSlate, winner of the 2001 Educational Software of the Year Award at JPL. NNSGC collaborated with JPL, UNO, and UNL to create this CD-ROM for teachers to use in the classroom to teach the basics of remote sensing, GIS, and GPS. The CD is a product of the Consortium for the Application of Space Data to Education (CASDE), whose goal is to utilize NASA's immense amount of data technology to stimulate and challenge K-12 in science, mathematics, and technology. The CD has been approved for free distribution through the UNO and NNSGC & EPSCoR. The GES has been involved in promoting, distributing, and demonstrating the DataSlate CD-ROM. The Nebraska Geospatial Extension Program sent out a June 2003 press announcement of the availability of DataSlate and received an overwhelming response for copies. The GES recently worked with 9-12 graders at Wayne State College for Native American Aeronautics Day; all students and teachers attending received a copy of the CD. NASA Space Grant Workforce Development funding will enable NNSGC to maintain and develop new lesson plans. Funding from NativeGEM will allow for the duplication of DataSlate CDs for free distribution to teachers across Nebraska and the United States.

Finally, the curriculum effort is working closely with UNO's College of Education and the Peter Kiewit Technology Institute in facilitating a web-based presence for the national Lewis and Clark Bicentennial celebration. UNO has been selected to host a website for teachers and to prepare model curriculum activities using NASA-related geospatial data to examine the historical route of Lewis and Clark, helping classrooms conceptualize challenges confronted along the way related to terrain, climate, and other earth systems science connections. The GES has been collaborating with personnel from Peter Kiewit and the College of Education on utilizing geospatial technologies in the Lewis and Clark Project. Collaborators on the project are aware of the overflight imagery of the Winnebago and Santee Sioux Reservations. They have requested that the imagery be used in the project. The GES will work to integrate all overflight imagery of the reservations into this project.

Metrics for Performance Indicator 2.3: Thurston County Geospatial Concept

Thurston County, NE, encompasses the Winnebago and Omaha Reservations, as well as many other small towns. The Nebraska Space Grant & EPSCoR Program has a successful history working in Thurston County with tribal schools, colleges, and the community. The NativeGEM proposal will build upon this success by fully developing the "Thurston County Geospatial Concept". The county is served by three Cooperative Extension agents. One agent is USDA-funded and is located at LPTC on the Winnebago Reservation, one agent is located in Walthill, NE, and the other in Concord, NE. These agents are eager to partner and utilize geospatial technologies in their county. Currently, there is not a 4-H club in Thurston County.

The Cooperative Extension agents would like to bring 4-H to Thurston County and integrate geospatial technologies. The extension agent in Walthill is familiar with the 4-H GPS Technologies program and would like to partner with the GES and Native IMAGE to bring this program to Thurston County.

The second piece of the Thurston County Geospatial Concept is to work with educators at schools on integrating geospatial technologies in the classroom. Currently, the Nebraska Space Grant & EPSCoR Program and the GES are working with several schools on implementing the Family Geoscience Night Program. These schools include Walthill, Winnebago, Pender, and Emerson. Pender Public School was just designated a NASA Explorer School. NASA Nebraska Space Grant & EPSCoR and the GES have been working closely with Pender. In addition, several teachers from these schools have attended geospatial training with the GES. A geospatial boot camp was held at Native IMAGE which brought together Cooperative Extension agents, faculty from LPTC, teachers from area schools, tribal government members, and community members. This workshop introduced the basic concepts of geospatial technologies and how they can be utilized by educators, extension agents, and tribal governments. NativeGEM will allow for more workshops, such as the geospatial boot camp, to continue and expand in scope.

Goal 3: Promote development of a workforce skilled in the use of geospatial technology and integrated with the staffs of user organizations.

Projected Outcomes: Student interns placed in the Winnebago Tribal Government; tribal mentor hired to supervise and guide interns; continuation of Nebraska Science and Technology Recruitment Fair, Native Schools Science Fair, and Women in Science Fair; GES-led geospatial workshops for teachers, tribal college faculty, tribal government members, extension agents; continued development of a non-credit certificate program in geospatial technologies.

Metrics for Performance Indicator 3.1: Native American Internship Opportunities

Several internship opportunities already exist within Native IMAGE. The institute developed internship opportunities for two students to serve as technical assistants. These technical assistants have attended training by the GES and work closely with the Native IMAGE Assistant Director. These assistants in turn will lend their skills to the Winnebago community, including the college, the schools, and government.

NativeGEM will allow the expansion of internship opportunities to within the Winnebago Tribal Government. College students from LPTC will be recruited to serve as interns on the Winnebago Reservation. The tribe has identified numerous geospatial needs that cannot possibly be met by the current tribal government. These needs include gathering GPS points for wells, feed lots, highways, and grain elevators. Students from LPTC, through Native IMAGE, will be given the opportunity to assist their own tribe by collecting data. These students are coming up through a pipeline from elementary, middle, and high school to LPTC. The Family Geoscience Program will expose them to concepts such as latitude and longitude, GPS, GIS, remote sensing. By the time they reach college, they will know the basic concepts and will be able to utilize a GPS receiver to collect data. A community mentor will oversee the internship program. This mentor will be someone who has attended geospatial training, is involved in the Family Geoscience Program, and who has ties to the tribal government.

Metrics for Performance Indicator 3.2 Geospatial Workshops

The infusion of geospatial technologies into tribal communities was a major deliverable for the NASA Space Grant Workforce 2002 initiative and was disseminated by employing local educational seminars, classes, and workshops (A report on training Nebraska's Workforce, 2003). NativeGEM builds upon the existing training structure the GES has already developed. Several workshops have been successfully delivered to tribal faculty, tribal government members, extension agents, teachers, interns at Native IMAGE, and the community-at-large. NativeGEM will further develop these workshops and allow them to expand in scope. The overflight imagery of the Winnebago and Santee Sioux Reservations has been a key teaching tool. Tribal community members have established an immediate connection with geospatial technologies by seeing imagery of their own reservation. Workshops will be focused towards specific end-users such as teachers who want to incorporate geospatial technologies into the classroom or tribal government leaders who want to utilize the technology to manage the resources on the reservation.

Metrics for Performance Indicator 3.3: Non-credit Certificate Program

NativeGEM will continue to support the development of a non-credit certificate program in geospatial technologies. Initial funding to begin development of the program has been granted through the recently awarded Space Grant Workforce Development Proposal. NNSGC is partnering with CALMIT, Native IMAGE/Little Priest Tribal College, and Minnesota Sea Grant to develop the only non-credit certificate in geospatial technologies offered in the state of Nebraska. Minnesota Sea Grant is currently writing a module on remote sensing and water to be used as part of this certificate program. The program will be designed for individuals to complete training in GIS, remote sensing, and GPS for use in their communities. The program will be an on-line, web-based program which will allow anyone in Nebraska to participate, particularly tribal communities. Currently, remote sensing training in Nebraska is only offered at universities for credit. The non-credit certificate in geospatial technologies will offer Nebraska residents an opportunity to develop or enhance skills and contribute to a stronger workforce.

Metrics for Performance Indicator 3.4: Nebraska Science Fairs

NativeGEM will allow Nebraska to continue hosting the Nebraska Science and Technology Recruitment Fair originated through NASA support last year. NASA, industry, and government personnel showcase student employment opportunities in the science fields, including geosciences. JPL Engineer and Nebraska native Kobie Boykins has facilitated such roles in the past for the NNSGC and has agreed to serve again. JPL University Program Administrator Linda Rodgers has also been approached. NASA Langley educators, scientists, and engineers will participate.

In addition, the GES will continue to be involved in the Annual Native Schools Fair and the Women in Science Career Fair. The Women in Science Fair brings high school youth from Nebraska and surrounding states to Lincoln, NE for a career fair. The GES will continue to highlight women working in the geosciences and encourage high school students to pursue careers with organizations such as NASA, USGS, and USDA. Both fairs target underrepresented groups and encourage careers in the geosciences.

(d) Time Table

Quarter	Benchmark
1	Install ERDAS IMAGINE software at geospatial data centers in Winnebago and Santee
1	Assess training needs and plan workshops for quarters 2, 3, and 4
1	GES meets with Thurston County Extension Agents to formulate plan for 4-H implementation
1	DataSlate CD-ROM Duplication
1	Meet with Winnebago Tribal Government to plan overflights
2	Develop Family Geospatial Science Program curriculum lesson #1
2	Present research outcomes at Aeronautics & Space Science Section of the Nebraska Academy of Sciences
2	Geospatial training workshop
	DataSlate CD-ROM dissemination at conferences, workshops, and outreach events
2	Evaluate progress on Thurston County 4-H implementation
2	Airborne Remote Sensing Overflight Missions
2	Collaboration with Agricultural Decision Support Systems Program
2	Evaluation/Validation of outcomes at Technical Advisory Committee Meeting
2	Native IMAGE Advisory Board Meeting
3	Meet with CALMIT & LPTC on non-credit geospatial certificate program
3	Collaborate with Lewis & Clark geospatial website project
3	DataSlate CD-ROM dissemination at conferences, workshops, and outreach events
3	Student Intern placement in Winnebago Tribal Government
3	Community mentor hired to supervise interns
3	Women in Science Fair
3	Geospatial training workshop
3	Native Schools Science Fair
3	Evaluate geospatial certificate program development progress
3	Develop Family Geospatial Science Program curriculum lesson #2
4	DataSlate CD-ROM dissemination at conferences, workshops, and outreach events
4	Geospatial training workshop
4	Develop Family Geospatial Science Program curriculum lesson #3
4	Evaluate non-credit geospatial certificate program development progress
4	Evaluation/Validation of outcomes at Technical Advisory Committee Meeting
4	Native IMAGE Advisory Board Meeting
1,2,3,4	Development of 2+2 relationships with 4 year institutions
1,2,3,4	Presentations of research at state/regional/national conferences
1,2,3,4	Continued updates to the NE Geospatial Extension Program's website
1,2,3,4	GES collaboration with fellow GESs to share training materials and data

(e) Management Plan

Management Structure: The GES has successfully worked with Land Grant and Space Grant in Nebraska and will continue these efforts. The GES's location within the NASA Nebraska Space Grant Program allows for deep involvement with Space Grant Programs. The GES works under the direct supervision of the Nebraska Space Grant Director. The state's land grant institution, the University of Nebraska at Lincoln, is only 40 miles away from the Space Grant Office. In addition, Little Priest Tribal College is also a Land Grant Institution. The GES has been working collaboratively with Cooperative Extension throughout the state of Nebraska. This proposal will further this cooperation, particularly in Thurston County.

Outreach Plan: The GES has been actively involved in identifying potential users, students, educators, and the public-at-large for utilization of geospatial technologies. The Nebraska Geospatial Extension Program has an active website with numerous resources. The website includes an image and data archive of all the airborne overflight missions in Nebraska by CALMIT. The website also includes over 500 links to geospatial-related websites, a calendar of events, and white papers and publications. This website is directly linked to the NNSGC website, CALMIT, Cooperative Extension, NASA Earth Science Enterprise, and USDA. The NEGEP has been issuing press releases since the program began in 2002, targeting educators, Cooperative Extension agents, tribal communities, other Geospatial Extension Specialists, and the public-at-large. In addition, a four-page brochure was developed with imagery and details about the program. This brochure was mailed out to a database of potential clients across Nebraska and to contacts across the United States. The GES has developed a database of over 1,000 geospatial contacts established at conferences, meetings, and seminars. The GES has utilized the print media, including the Winnebago Tribal Newspaper, to get geospatial technologies out to potential users. The UNO media has been briefed about the NEGEP and plans to write articles about the remote sensing overflights and other activities of the program. UNO media also plans to work with the GES to garner Nebraska media coverage including television and print. The GES will continue to fully develop the outreach plan already in place.

Demonstrated Commitments: The administrative and fiscal aspects of this program are supported by the University of Nebraska at Omaha's Office of Sponsored Programs. Match is being provided for the Project Director for one month as well as one month operations support from the Administrative Technician.

Anticipated Performance Metrics: The outcomes of this project will impact tribal communities in numerous ways. These communities will receive geospatial training and access to data to empower them to make decisions about their land. The GES will guide tribal entities by providing decision support and training, but the tribe will make the decisions on how to manage reservation land and resources. The Family Geoscience Program and 4-H will bring up a new generation of youth exposed to these technologies. It is hoped that these students will attend higher education institutions and aspire for careers in the geosciences. The training teachers, educators, and extension agents receive will be passed on to potential users in Nebraska. The airborne remote sensing overflight data will not only be used by the tribal government, but

utilized for training and education purposes. It is extremely powerful to show educators, students, tribal government leaders, and members of the community imagery and data that is relevant to them. The continued development of a non-credit certificate program in geospatial technologies will have an enormous impact on workforce development in Nebraska. Currently, the only training available in remote sensing is at UNL and UNO for credit. None of the courses are available on-line, which limits access to numerous clients including tribal communities. Due to the distance to these universities from tribal communities in Nebraska, it is not possible for them to receive this training.

(f) Evaluation and Monitoring of Project

Numerous evaluation mechanisms are in place for this program. Technical Advisory Committee members are called upon to ensure continuous quality improvement of all funded programs. This committee holds scheduled meetings semi-annually and calls upon its members to participate in additional reviews periodically throughout the year. These reviews include periodic reporting forms from funded researchers and students.

An advisory board has been formed for Native IMAGE. This advisory board consists of selected officials from state and local government, as well as academic and scientific fields. Several employees from ESRI, Creighton University, UNO, the Nebraska GIS Steering Committee, South Dakota State University, USGS EROS Data Center, as well as other organizations have agreed to serve on the advisory board.

As the Space Grant program moves toward the 15-year evaluation process, NNSGC is well-positioned to maintain its ranking as the top Capability Enhancement Consortium.

Conclusion and Future Vision

NativeGEM builds and enhances the successful initiatives of the GES and NNSGC. A major focus of the Nebraska Geospatial Extension Program has been on tribal communities in Nebraska. NativeGEM further develops the activities, collaborations, and achievements the GES has initiated since the program was established in 2002. This proposal addresses all three project areas solicited by CSREES: decision support; education in remote sensing and geospatial technologies; and workforce development. The activities and achievements from NativeGEM will make a tremendous difference in the lives of Nebraska's citizens.

The future vision for NativeGEM after the first year of funding includes activities such as:

- Continued utilization of the Nebraska Remote Sensing Facility
 - Additional overflights with new and developing sensors on the Winnebago Reservation
 - Lidar, SAR, inSAR
- Enhancement and delivery of the non-credit certificate program in geospatial technologies
- Expansion of the Family Geoscience Program from Thurston County to other schools across Nebraska

- DataSlate educational CD-ROM updates
- Additional collaboration with Thurston County Extension on 4-H geospatial activities
- Continued support for the Native American Internship Program with the Winnebago tribal government
- Additional geospatial workshops and training for tribal members, educators, faculty, and the community-at-large
- Further engagement of the tribal community in decision support

References

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- Harrington, J. (2003, March). *EPSCoR and IDEA: Across the agencies*. Presented at the National Science Foundation EPSCoR Conference, Washington, D.C.
- Lehrer, H., & Zendajas, E. (2001). *Family aeronautical science: Improving math, science, and technology skills among Nebraska Native American Children*. Omaha, NE: NASA Nebraska Space Grant and EPSCoR.
- Narayanan, R., Bowen, B., & Nickerson, J. (2002, November). *Airborne remote sensing for agricultural research and commercialization applications* [White Paper]. Omaha, NE: NASA Nebraska Space Grant & EPSCoR.
- NativeView (n.d.). Retrieved February 16, 2004 from <http://www.sinte.edu/nativeview/index2.html>
- National Agricultural Decision Support Systems (2004, February). Retrieved from <http://nadss.unl.edu>
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- Vlasek, K., Lehrer, H., & Bowen, B. (2004, February). *A case study on implementing geospatial technologies on Nebraska's Native American Reservations*. [White Paper]. Omaha, NE: NASA Nebraska Space Grant & EPSCoR.
- Vlasek, K., Lehrer, H., Bowen, B., & Nickerson, J. (2004, February). *Native IMAGE (Institute for Managing Applications in Geospatial Extension): A Nebraska geospatial extension initiative*. [White Paper]. Omaha, NE: NASA Nebraska Space Grant & EPSCoR.

Appendix

Acronym List

AISA	Airborne Imaging Spectrometer
CALMIT	Center for Advanced Land Management Information Technologies
CASDE	Consortium for the Application of Space Data for Education
CRT	Collaborative Research Team
CSREES	Cooperative State Research, Education, & Extension Service
EPA	Environmental Protection Agency
EPSCoR	Experimental Program to Stimulate Competitive Research
EROS	Earth Resources Observations Systems
ESRI	Environmental Systems Research Institute
GIS	Geographic Information Systems
GPS	Global Positioning System
GES	Geospatial Extension Specialist
JPL	Jet Propulsion Laboratory
LIS	Land Information Systems
LPTC	Little Priest Tribal College
NASA	National Aeronautics & Space Administration
NativeGEM	Nebraska Native Geospatial Extension Model
Native IMAGE	Native Institute for Managing Applications in Geospatial Extension
NEGEP	Nebraska Geospatial Extension Program
NNAOP	Nebraska Native American Outreach Program
NICC	Nebraska Indian Community College
NOAA	National Oceanic & Atmospheric Administration
NNSGC	NASA Nebraska Space Grant Consortium
NSF	National Science Foundation
STEM	Science, Technology, Engineering, and Mathematics
UNL	University of Nebraska at Lincoln
UNO	University of Nebraska at Omaha
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WPS	Winnebago Public School

Facilities and Equipment

NASA Nebraska Space Grant & EPSCoR Office Facilities and Equipment

The NNSGC Director works from an office that has been provided as part of his academic appointment in Allwine Hall. The specific Space Grant facilities consist of a suite of offices located in the Engineering Building adjacent to Allwine Hall. The main office suite in Engineering houses the NNSGC Program Coordinator, Administrative Assistant, Research Implementation & Communications Specialist, and Space Grant Research Fellow. The second office suite, located across the hall, houses the Geospatial Extension office. This office is maintained by the Geospatial Extension Specialist and a Graduate Research Fellow.

Facilities in the NNSGC offices include several well-equipped rooms, which hold 6 computers, 6 laser printers, a network printer, a typewriter, 3 multi-extension phones, 2 fax machines, 2 photocopiers, 8 large freestanding file cabinets, 5 bookshelves, and ten chairs. The main office suite maintains a 24-hour dedicated phone for the Nebraska Space Grant and EPSCoR programs. This office is staffed part-time by a Space Grant fellow conducting research. This fellow is able to answer questions and promote the Space Grant more efficiently on campus. The Geospatial office has a 42" Hewlett Packard plotter, Magellan Gold GPS receiver, iPAQ device, and GIS and remote sensing software programs. In addition to the main office suite and the geospatial office, NNSGC has a large Community Resource Center. This classroom size room has 11 tables and 22 chairs that can be configured in numerous ways for different audiences and purposes. A projector, 35m slide projector, screen, and white board are all available for use. The Resource Center includes the newly implemented Geospatial Data Center. This center consists of a computer workstation with GIS and remote sensing software.

The Engineering Building basement houses a flight lab, equipped with simulation devices. A technology office also exists for a grant-funded manager of technology and a student assistant. The building is also home to the Space Grant-sponsored *Journal of Air Transportation*. All together, these new areas have created 530 square feet of additional space, which is dedicated to NASA-related activities.

Nebraska Airborne Remote Sensing Facilities and Equipment

The University of Nebraska at Lincoln's CALMIT and the University of Nebraska at Omaha's Aviation Institute have cooperatively developed the Nebraska Remote Sensing Facility. These two institutions bring together a unique specialty that is a tremendous resource for Nebraska.

The aircraft is a single-engine Piper Saratoga with advanced aviation technology. The Saratoga was modified with the following remote sensing equipment:

- Kodak DCS-420 color infrared digital camera
- Analytical Spectral Devices (ASD) spectroradiometer operating in the 350-2500nm wavelength range
- NASA Goddard Space Flight Center provided and refurbished Airborne Laser Polarimeter System (ALPS) operating at 532 and 1064nm wavelengths

- UNL developed noise radar scatterometer operating at 1.275 GHz (L-band) and 10 GHz (X-band) frequencies
- Canon 2500 digital video camera
- Airborne Imaging Spectrometer (AISA) operating in the 400-900nm wavelength range which is calibrated at NASA Stennis Space Center
- Preliminary work on the construction of a multi-wave lidar (light detection and ranging) system
- Synthetic Aperture Radar (SAR) currently being tested
- Interferometric SAR (inSAR) under development
- Laser fluorescence sensor under development

Specialized Airborne Capabilities

- The aircraft platform provides a unique mechanism for obtaining data and images at a very high spatial resolution, which is required for site specific management in agriculture.
- The airborne data can be acquired at precisely specified, often critical times during the growing season
- Aircraft platforms provide the opportunity to deploy commonly available and widely-used sensors such as multi-spectral digital data and video cameras. As a result, these platforms test innovative next-generation technologies that are neither currently available on satellite platforms nor are likely to be available within the coming decade (e.g., laser reflectometers, imaging spectrometers, laser fluorescence sensors) and to configure arrays of diverse types of sensors as needed
- Data acquired by means of airborne sensors for agricultural applications can be delivered to producers and managers in near-real time and at low cost

Key Personnel

(a) Roles and Responsibilities

Dr. Brent Bowen

Project Director

NASA Nebraska Space Grant & EPSCoR

University of Nebraska at Omaha

Aviation Institute

1 month salary as match

Oversight of the project

Karisa Vlasek

Geospatial Extension & Research Specialist

NASA Nebraska Space Grant & EPSCoR

University of Nebraska at Omaha

.22 FTE

Implementation of NativeGEM

Jenny Gerritse

Administrative Technician I

University of Nebraska at Omaha

Aviation Institute

1 month as match

Operations support

Collaborations with Other Organizations

Little Priest Tribal College/Native IMAGE

Collaborator to GES Vlasek through Native IMAGE at LPTC in Winnebago

Thurston County Extension

Collaborator on Thurston County 4-H program, outreach activities with Native IMAGE, and training for extension agents

Walthill Public Schoools

Collaborator on Family Science Curriculum

Pender Public Schools

Collaborator with on Family Science Curriculum

Emerson Public Schools

Collaborator with on Family Science Curriculum

CALMIT-University of Nebraska at Lincoln

Collaborator on non-credit certificate program and airborne remote sensing overflights

Minnesota Sea Grant

University of Minnesota

Collaborator on non-credit certificate program curriculum module

Nebraska Agricultural Decision Support Systems

University of Nebraska at Lincoln

Collaborator on decision support systems for tribal communities

BRENT DAVID BOWEN

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EDUCATION:

DOCTOR OF EDUCATION

Oklahoma State University

Higher Education

Stillwater, Oklahoma

May 1990

Aviation Education

MASTER OF BUSINESS

Oklahoma City University

Oklahoma City, Oklahoma

Finance

August 1988

ADMINISTRATION

BACHELOR OF

SCIENCE

Oklahoma

State University

Stillwater, Oklahoma

December 1983

Public Affairs

Business Administration

PROFESSIONAL EXPERIENCE IN HIGHER EDUCATION:

- 8-92/Present *Director, Aviation Institute, and Distinguished Professor of Aviation (with tenure), Graduate Faculty Fellow in the NU system Graduate College, University of Nebraska at Omaha. (Associate Professor 8-92, Professor 9-96).*
- 6-93/Present *Director, Division of Aviation and Transportation Policy, and Principal Investigator, Nebraska NASA Space Grant and EPSCoR Programs. Omaha, NE.*
- 8-89/8-92 *Director, Aviation Management Program and Assistant Professor, W. Frank Barton School of Business; Associate Member, Graduate Faculty, The Wichita State University; Wichita, KS.*

PROFESSIONAL AFFILIATIONS:

Academic:

Alpha Eta Rho International Aviation Fraternity, Air Transport Research Society of the World Conference on Transportation Research, American Society for Public Administration, Council on Aviation Accreditation, Nebraska Academy of Sciences, North-Central Region Civil Air Patrol Aviation Education Association, Transportation Research Board/National Research Council, Transportation Research Forum, University Aviation Association, World Aerospace Education Organization.

Industry:

Aircraft Owners and Pilots Association, Civil Air Patrol (National), Experimental Aircraft Association, National Air and Space Museum, National Air Transportation Association, National Coalition of Spaceport States, Nebraska Aviation Council, Aero Club of Washington, D.C

PROFESSIONAL DISTINCTIONS:

Appointed, National Academy of Science/National Research Council Panel on Transportation Leadership. Fall 2003.

Certificate of Appreciation, NASA Langley Research Center.

Appointed to Pi Alpha Alpha, National Honor Society in Public Administration.

Appointed to the Editorial Board, Journal of Transport and Telecommunications

Invited Participant, FAA Administrator's National Academy of Sciences Workshop Series on Aviation Gridlock

SERVICE REPORT:

Academic and Administrative Service In Progress:

State and National NASA Grant Leadership

Chair, EPSCoR Caucus, National Council of NASA Space Grant Directors. October 2003-Present.

Chair, Nominating Committee, National Council of NASA Space Grant Directors. March 2001-Present.

Member, Committee on Grants and Contracts, National Space Grant Foundation. October 2000-Present.

Chair, Aerospace Technology Working Group, National Council of NASA Space Grant Directors. April 1994-Present.

Member, National Council of NASA Space Grant Directors. June 1993-Present.

Project Director, Nebraska NASA Space Grant Consortium. June 1993-Present.

Nebraska Space Grant Consortium Representative, Nebraska Aviation Council. 1992-Present.

Nebraska Space Grant Consortium Representative, Nebraska Academy of Sciences. September 1992-Present.

COLLEGIATE HIGHLIGHTS:

Delegate to Columbia University's 25th American Assembly on Domestic Policy, United States Air Force Academy, March 1983. Senate Delegate to the Oklahoma Intercollegiate Legislature, November 1982. Service Scholarship Participant in a University Counseling Program for Financial Aid Administration and Distribution, May 1982 - December 1983.

COLLEGIATE HONORS:

Elected President of the Higher Education Doctoral Student Association, Oklahoma State University (1988-1989), President's Honor Roll, Dean's Honor Roll, Graduate Research Assistant

in Educational Administration and Higher Education, Phi Sigma Alpha National Political Science Honor Society, Phi Eta Sigma Honor Fraternity, Lew Wentz Foundation Scholarship Recipient, University Scholarship Recipient, Residence Hall Association Scholastic Achievement Award, National Leadership Institute Participant.

Peer Reviewed Academic Papers: [Reviewed and competitively selected papers]

Bowen, B., Vlasek, K., Webb, C. (March 2004) *An Assessment of Remote Sensing Applications in Transportation*. 45th Annual Proceedings of the Transportation Research Forum. In-process.

O'Neil, P., Box, R., Bowen, B. (March 2003) *Spaceport Development: A New Transportation Infrastructure Development*. 44th Annual Proceedings of the Transportation Research Forum. 12 pps.

Bowen, B., Metz, N. (July 2002) *Policy Research, A Case in Agency Transition: The NASA AGATE/SATS Program*. Proceedings of the Air Transport Research Society International Conference. Seattle. 20 pps.

Invited and Other Papers: [Invited, Selected, and other white papers presented]

Gogos, G., Bowen, B., Nickerson, J., et al. (October 2003). *Nebraska EPSCoR's Propulsion Research Program*. White paper presented at the National Space Grant Conference. Wichita, KS. 7 pps.

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Box, R., Bowen, B., O'Neil. (October 2002). *The Nebraska Spaceport Research Program*. White paper presented at the National Space Grant Conference. San Juan, PR. 6 pps.

Bowen, B., Lehrer, H., Nickerson, J. (April 2002). *A Process Plan for Consensus Building in the Evaluation of the NSGC Native American Outreach Program*. Proceedings of the 122nd Meeting of the Nebraska Academy of Sciences. 7 pps.

Metz, N., Bowen, B. (April 2002). *Policy Research Results from a Retrospective Assessment of the NASA AGATE Program: Implications for NASA SATS*. Proceedings of the 122nd Meeting of the Nebraska Academy of Sciences. 5 pps.

Box, R., Bowen, B., O'Neil, P. (March 2002). *NASA Spaceport Research: The Nebraska*

Workplan. White paper presented at the National Space Grant Directors Fall Conference 2002. 8 pps.

Box, R., Bowen, B., O'Neil, P. (March 2002). *NASA Spaceport Research: Opportunities for Space Grant and EPSCoR Involvement*. Paper presented at the National Space Grant Aerospace Technology Symposium 2002. 6 pps.

Bowen, B., Gogos, G., et al. (March 2002). *The Nebraska NASA EPSCoR Research Program in Propulsion Technology*. Paper presented at the National Space Grant Aerospace Technology Symposium 2002. White Sands, NM. 5 pps.

Bowen, B., Narayanan, R., et al. (October 2001). *The Nebraska NASA EPSCoR Research Program in Airborne Remote Sensing*. Paper presented at the Western Region Space Grant Conference. Warm Springs Reservation, OR. 6 pps.

Monographs:

Vlasek, K., Bowen, B., Russell, V., et al (November 2003). *Aerospace Workforce Development: The Nebraska Proposal; and Native View Connections: A Multi-Consortium Workforce Development Proposal: UNOAI Report 03-4*. The UNO Aviation Monograph Series. Omaha, NE: University of Nebraska at Omaha. 16 pps.

Schaaf, M., Bowen, B., Fink, M., Nickerson, J., et al (October 2003). *Fifteen Years of Collaborative Innovation and Achievement: NASA Nebraska Space Grant Consortium 15-Year Program Performance and Results Report: UNOAI Report 03-3*. The UNO Aviation Monograph Series. Omaha, NE: University of Nebraska at Omaha. 30 pps.

Bowen, B., Fink, M., Schaaf, M. (Eds.). (March 2002). *Proceedings of the NASA Aerospace Technology Symposium 2002. UNOAI Report 02-4*. Omaha, NE: University of Nebraska at Omaha Aviation Institute. 134 pps.

Bowen, B., et al. (August 2002). *Nebraska Initiative for Aerospace and Industrial Development, Final Report. UNOAI Report 02-1*. Omaha, NE: University of Nebraska at Omaha Aviation Institute. 29 pps.

Bowen, B., et al. (December 2001). *NASA EPSCoR Nebraska Preparation Grant: Final Report. UNOAI Report 01-1*. Omaha, NE: University of Nebraska at Omaha Aviation Institute. CD-ROM.

Bowen, B., et al. (May 2001). *The NASA Nebraska EPSCoR Preparation Grant Program, Final Report. UNOAI Report 01-2*. Omaha, NE: University of Nebraska at Omaha Aviation Institute. CD-ROM.

Bowen, B., Woods, S., Narayanan, R., Smith, R., Gogos, G., et al. (December 2000). *The Aeronautics Education, Research, and Industry Alliance (AERIAL): A Proposal to NASA EPSCoR 2000. UNOAI Report 00-5*. Omaha, NE: University of Nebraska at Omaha Aviation

Institute. 96 pps.

Grandgenett, N., Bowen, B., et al. (September 2000). *The University of Nebraska at Omaha Center for Space Data Use in Teaching and Learning. UNOAI Report 00-4*. Omaha, NE: University of Nebraska at Omaha Aviation Institute. 36 pps.

Bowen, B., Woods, S., et al. (March 2000). *The NASA Nebraska EPSCoR Preparation Grant Proposal, Year 2. UNOAI Report 00-1*. Omaha, NE: University of Nebraska at Omaha Aviation Institute. 20 pps.

Published and Presented Abstracts / Poster Presentations:

Bowen, B., Schaaf, M. (September 2003). *Nebraska's Aerospace Workforce Development Program*. Abstract presented at the Western Region Space Grant Conference. Rapid City, SD.

Vlasek, K., Bowen, B., Schaaf, M. (September 2003). *Nebraska's Geospatial Extension Program*. White paper/poster presented at the Western Region Space Grant Conference. Rapid City, SD. 6 pps.

Tarry, S., Bartle, J., Bowen, B., Moussavi, M., Avery, S., Lehrer, H. (March 2003). *Small Aircraft Transportation System (SATS) Research Collaborations with the NASA Langley Research Center (LaRC): A NASA Nebraska EPSCoR Sponsored Research Endeavor*. Poster presentation at the National NASA EPSCoR Conference. Washington, D.C.

Lehrer, H., Nickerson, J., Bowen, B. (March 2003). *Native IMAGE: Institute for Managing Applications of Geospatial Extension. A NASA Nebraska Space Grant and EPSCoR Sponsored Research Endeavor*. Poster presentation at the National NASA EPSCoR Conference. Washington, D.C.

Bowen, B., Metz, N. (October 2001). *The Policy Research Construct: Applications to Aviation and Space Research*. Presented at the Research Roundtable, Fall Conference of the University Aviation Association. Nashville, TN.

Miscellaneous reports and documents:

Bowen, B., Fink, M. (March 2004). *Aerospace Technology Working Group Report*. National Council of NASA Space Grant Directors Meeting, Washington, D.C. 2 pps.

Bowen, B., Fink, M. (March 2004). *Report on the Status of Nominations*. National Council of NASA Space Grant Directors Meeting, Washington, D.C. 2 pps.

Bowen, B. (January 2004). *Evaluation Report for the NASA National College and Fellowship Program (an evaluation of 4 other state programs)*. Submitted on-line to NASA Headquarters. 48pps.

Bowen, B., Fink, M. (October 2003). *Aerospace Technology Working Group Report*. National Council of NASA Space Grant Directors Meeting, Wichita. 2 pps.

Bowen, B., Fink, M. (October 2003). *Report on the Status of Nominations*. National Council of NASA Space Grant Directors Executive Board Meeting. Wichita, KS. 2 pps.

Bowen, B., Fink, M. (March 2003). *Aerospace Technology Working Group Report*. National Council of NASA Space Grant Directors Meeting, Washington, D.C. 2 pps.

Bowen, B., Fink, M. (October 2002). *Aerospace Technology Working Group Report*. National Council of NASA Space Grant Directors Meeting, Dorado, PR. 2 pps.

Bowen, B., Fink, M. (September 2002). *Aerospace Technology Working Group Report*. Presented at the Western Region NASA Space Grant Conference. Big Sky, MT. 2 pps.

Bowen, B., Fink, M. (July, 2002). *Report on the Status of Nominations*. National Council of NASA Space Grant Directors Executive Board Meeting. Boulder, CO. 3 pps.

Bowen, B., Fink, M. (March 2002). *Aerospace Technology Working Group Report*. National Council of NASA Space Grant Directors Meeting, Washington, D.C. 2 pps.

Bowen, B., Fink, M. (October 2001). *Aerospace Technology Working Group Report*. Presented at the Western Region NASA Space Grant Conference. Warm Springs, OR. 2 pps.

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Bowen, B., Fink, M. (September 2001). *Nominations Committee Report*. National Council of NASA Space Grant Directors Meeting, Fairbanks, AK. 2 pps.

Bowen, B., Fink, M. (July, 2001). *Report on the Status of Nominations*. National Council of NASA Space Grant Directors Executive Board Meeting. Kennedy Space Center, FL. 3 pps.

Bowen, B. (July, 2001). *Status Report on the Aerospace Technology Working Group*. National Council of NASA Space Grant Directors Executive Board Meeting. Kennedy Space Center, FL. 2 pps.

Bowen, B., Fink, M. (September, 2000). *Report on State Government NASA Collaborations*. National Council of NASA Space Grant Directors. 3 pps.

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ACADEMIC PREPARATION

University of Nebraska at Omaha

August 1999

Master of Public Administration
Aviation Administration Minor

August 1997

Bachelor of Science, Geography

PROFESSIONAL EXPERIENCE

August 2002-Present

Geospatial Extension and Research Specialist, NASA
Nebraska Space Grant & EPSCoR, Aviation Institute,
University of Nebraska at Omaha.

Professional and Managerial Duties: Responsible for the Nebraska Geospatial Extension Program funded by NASA Nebraska Space Grant and EPSCoR Programs. Duties include technology transfer and commercialization of geospatial data and systems, building a statewide network of geospatial expertise, collaboration with the state extension office and University of Nebraska at Lincoln's Center for Advanced Management Information Technologies. Development and delivery of geospatial programs, seminars, and workshops, engaging the K-16 community in geospatial science, providing programs to maximize workforce development, establishing and maintaining geospatial learning centers at community and tribal colleges, acting as a liaison with business incubators and technology parks statewide, developing and maintaining website content, and engaging in public relations including press releases, newspaper articles, and dissemination materials design. Additionally, developing capacities in distance and technology education in geospatial areas, supporting the coordination of the University of Nebraska at Omaha geospatial lab, engaging in continuing education to be at the forefront of technical skills, geospatial reporting to NASA, pursuing new funding opportunities through grant writing, participating in relevant organizations and coordinating with other geospatial extension specialists in the nation. Finally, serve as team member and coordinator for the Geospatial

collaborative research team for EPSCoR years four and five.

HONORS AND ACHIEVEMENTS

2003	Honorable Mention, Poster Presentation, Midwest ArcUser's Group Conference
1999	Charles Durham Graduate Scholarship
1999	NASA EPSCoR Graduate Fellowship
1998	NASA Space Grant Graduate Fellowship
1998	Who's Who Among Students in American Universities & Colleges
1997	NASA Space Grant Undergraduate Fellowship

PROFESSIONAL SOCIETIES AND ASSOCIATIONS

Transportation Research Forum	Member 2004-Present
Association for Women Geoscientists	Member 2004-Present
Soil and Water Conservation Society	Member 2003-Present
Nebraska Agricultural Technologies Association	Member 2003-Present
NASA Space Grant Earth Enterprise Working Group	Member 2002-Present
Association of American Geographers	Member 2002-Present
American Society for Photogrammetry and Remote Sensing	Member 2002-Present
Nebraska GIS/LIS Association	Member 2002-Present
Omaha User's Group-Nebraska GIS/LIS Association	Member 2002-Present
Lincoln User's Group-Nebraska GIS/LIS Association	Member 2002-Present
Intertribal GIS Council	Member 2002-Present
Alpha Eta Rho, Upsilon Nu Omicron Chapter	Member 1997-Present
Gamma Theta Upsilon, Gamma Chi Chapter	Member 1996-Present
Pi Gamma Mu, Political Science Honor Society	Member 1996-Present

WORKSHOP DEVELOPMENT AND DELIVERY

Vlasek, K., Nickerson, J., & Schaaf, M. (2003, May). *Grant writing for the GIS professional*. Short course taught at the 2003 Nebraska GIS Symposium, Lincoln, NE.

Rundquist, D., Perk, R., Arnold, J., Felton, J., Flynn, M., & Vlasek, K. *Remote sensing*. Workshop taught at the Center For Advanced Land Management Information Technologies, Lincoln, NE.

OUTREACH ACTIVITIES

April 2004	<i>Native American Retreat, Omaha, NE</i>
March 2004	<i>Native Schools Science Fair, Walthill, NE</i>
February 2004	<i>Winnebago Family Geoscience Night, Winnebago, NE</i>
February 2004	<i>Women in Science Conference, Lincoln, NE</i>
September 2003	<i>NE Native American Aviation and Aerospace Day, Wayne, NE</i>

April 2003

Native Schools Science Fair, Winnebago, NE

February 2003

Women in Science Conference, Lincoln, NE

PUBLICATIONS, PAPERS, AND ABSTRACTS

- Bowen, B., Lehrer, H., Brown, S., Nickerson, J., & Vlasek, K. (2003, March). *Native IMAGE (Institute for Managing Applications in Geospatial Extension): A Nebraska Geospatial Extension Initiative*. Omaha, NE: NASA Nebraska Space Grant & EPSCoR.
- Bowen, B., Vlasek, K., & Webb, C. (2004, March). *An Assessment of Remote Sensing Applications in Transportation*. Proceedings of the Annual Meeting of the Transportation Research Forum, Evanston, IL.
- Trimm, J., Vlasek, K., & Bowen, B. (2002). *Existing geospatial programs at American Indian colleges*. Omaha, NE: University of Nebraska at Omaha Aviation Institute.
- Vlasek, K., & Lehrer, H. (2003, April). Native IMAGE (Institute for Managing Applications in Geospatial Extension) [Abstract]. *Proceedings of the Nebraska Academy of Sciences, USA*, 33.
- Vlasek, K., Lehrer, H., Bowen, B., & Webb, C. (2003). *Utilizing geospatial technologies on Nebraska's Native American Reservations: A case study*. Omaha, NE: University of Nebraska Space Grant & EPSCoR (in progress).
- Vlasek, K., Schaaf, M., & Bowen, B. (2003, September). *The Nebraska geospatial extension program*. Omaha, NE: NASA Nebraska Space Grant & EPSCoR.
- Vlasek, K., & Bowen, B. (2004, February). *The Nebraska Geospatial Extension Program*. Omaha, NE: NASA Nebraska Space Grant & EPSCoR (in progress).
- Vlasek, K., & Webb, C. (2004, March). *Utilizing Geospatial Technologies on the Winnebago Indian Reservation*. [Abstract]. Proceedings of the Association of American Geographers Conference, Philadelphia, PA.
- Vlasek, K., & Webb, C. (2004, May). *Utilizing Hyperspectral Remote Sensing on the Winnebago Indian Reservation in Winnebago, Nebraska*. [Abstract]. Proceedings of the American Society for Photogrammetry and Remote Sensing, Denver, CO.

GRANT PROPOSALS

- Lehrer, H., Vlasek, K., Nickerson, J., & Bowen, B. (2002, October). *Geoscience Education Opportunities on the Winnebago Indian Reservation (GEOWIRE)*. Proposal to the National Science Foundation, \$900,000 [not funded].
- Fink, M., Vlasek, K., Nickerson, J., Bowen, B., & Russell, V. (2003, November). *Nebraska Aerospace Workforce Development*. Proposal to NASA Space Grant,

\$91,000 [funded].

Vlasek, K., Fink, M., Nickerson, J., Bowen, B., & Russell, V. (2003, November). *NativeView Connections*. Proposal to NASA Space Grant, \$25,000 [funded].

Vlasek, K., Bowen, B., & Russell, V. (2004, March). *Nebraska Native GEM (Geospatial Extension Model)*. Proposal to the United States Department of Agriculture, \$50,000 [pending].

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Q U A L I F I C A T I O N S

My time management skills are exceptional. I will be able to keep all information and documents up to date.

I am a versatilist in that I can do all parts of a project. I can design, implement, and follow through on what needs to be done.

I have tremendous ability to manage and train people. I adapt quickly to their learning styles.

W O R K H I S T O R Y

Administrative Technician, Aviation Institute, University of Nebraska at Omaha

2002-present

I report directly to the Director of the Aviation Institute. I assist him with his schedule as well as the smooth running of the office in his absence. I enter weekly payroll in the University accounting system (SAP), as well as the Institute's invoices. I created Access databases to capture student information as well as the Advisory Board and Alumni information. I am also involved on the Institute marketing team to promote student enrollment. I am responsible for reviewing our budget and finding proactive ways to decrease spending. I supervise student workers and handle disciplinary needs. I also advise students interested in minoring in aviation. Most recently I successfully coordinated an all day event that encompassed over 350 people between three separate events.

Shift Supervisor, LifeCom, Rocky Mountain Helicopters

2001- 2002

I supervised 9 people per shift, dispatching air medical helicopters across the United States. This job required people skills, split second decisions and taught me about the inner workings of hospitals. I also assisted with interviewing, hiring and training new employees. I created a mentoring program for people interested in the supervisor position. This position was also responsible for overseeing call center personnel in relation to patient admitting for a major Midwestern hospital and organ procurement for a major network on the east coast.

Business Manager, LifeNet of the Heartland, RMH

1999-2001

I was responsible for all accounting and inventory needs of the Omaha

program. I also handled the scheduling of all public relation events. I worked closely with the program director creating reports and charts for presentation. I am experienced with all Microsoft Office software, including Excel, Access and PowerPoint as well as word processing. This job was eliminated as they consolidated positions and the director's main office and home was in Kansas. I was also a part time dispatcher while doing this full time. I started my employment with LifeCom-RMH in 1999.

Co-Director, Centering Corporation
1997- 1999

I handled all the office manager responsibilities in this family-owned, mail-order bereavement resource business. I processed all mail and telephone orders daily and handled all the accounts receivable collections.

Store Manager, Waldenbooks
1987- 1997

I coordinated all hiring, training, and payroll management. Inventory and following corporate merchandising were also major responsibilities. I began employment with Waldenbooks in 1987 as a bookseller and was promoted to assistant manager in 1988 and store manager in 1992.

E D U C A T I O N

Bachelor of Science in Business Administration, University of Nebraska at Omaha, 1988

High School Diploma, Central High School, Omaha, 1984

Emergency Medical Technician-A, 1997 (current)

Veterinary Assistant, Thompson Education Direct, 2003

V O L U N T E E R

Hearts United for Animals, Auburn, NE, board member and volunteer coordinator, 2002

Volunteer since 2000

Jan Bingen

220 Sycamore Street #39
Vermillion, SD 57069
email: jbingen@lptc.bia.edu

phone (home): 605 - 624 - 3418
office: 402 - 878 - 2380
fax: 402 - 878 - 2355

Work Experience:

Computer Science Department Chair/Instructor – LPTC, Winnebago, NE–August 2000 to present

- ◆ Writing curriculum and setting policy for the Computer Science Department
 - Developing and implementing courses to upgrade the department
 - Updating and re-evaluating existing courses to keep current with changes in technology
- ◆ Teaching all levels of Computer Science courses
 - Introductory and Application courses (Microsoft Office Suite, MS Publisher, Internet)
 - High-level programming, Database Management, Systems Analysis, Computer Organization
- ◆ Evaluating and recording students progress
- ◆ Actively participating in grant work with the institution
 - Native IMAGE (Geospatial Grant) – February 2003 to present
 - Maya Connection Grant – August 2000 to June 2002 (grant completion)
- ◆ Attending and actively participating in committee meetings as required
 - Faculty Senate – Chair Fall 2001 to present
 - Curriculum & Instruction – Secretary, Spring 2001 to present
 - Faculty Development – Secretary, Fall 2002 to present
 - Assessment – Secretary, Spring 2001 to Fall 2002
- ◆ Serving as the advisor for the local chapter of A.I.B.L (American Indian Business Leaders)

Technical Support Professional, Gateway 2000, Sioux Falls, SD–October 1999 to July, 2000

- ◆ Actively assisting Gateway Clients in the resolution of technical issues relating to a variety of operating systems
 - MS-DOS with Windows 3.1, Windows 95 and Windows 98
 - Maintaining Gateway's warranties and standards
- ◆ Actively participating in weekly training sessions to maintain a current knowledge of Gateway products and procedures
- ◆ Actively participating in weekly team meetings
 - Discussing Gateway policies, procedures and team goals
- ◆ Actively participating in weekly coaching sessions with Team Manage
 - Discussing personal progress and setting personal long term and short term goals

Instructor – Upward Bound/MISP, USD, Vermillion, SD–Summer 1999

- ◆ Coordinating and teaching course in High School Geometry
- ◆ Evaluating and recording student progress

- ◆ Making weekly status reports as to students' attendance, participation and academic progress

Instructor – Mathematical Sciences Department, USD, Vermillion, SD–1998 to 1999

- ◆ Teaching courses in College Algebra, Applied Finite Mathematics, and Precalculus
- ◆ Teaching course in Week-end University using Web-CT
- ◆ Evaluating and recording student progress

Instructor – Computer Science, Mount Marty College, Yankton, SD–1998 to 1999

- ◆ Teaching upper-division courses in Machine Organization and Systems Analysis
- ◆ Teaching lower-division course in Management Information Systems
- ◆ Evaluating and recording student progress

Course Coordinator – Computer Science Department, USD, Vermillion, SD–1997 to 1998

- ◆ Conducting weekly training sessions for student helpers
- ◆ Establishing grading criteria for laboratory exercises
- ◆ Organizing weekly work schedule for student helpers

Teaching Assistant – 1996 to 1998 (including summer sessions 1996 and 1997)

- ◆ Instructing students in Microcomputer Applications using Microsoft Word, Excel, PowerPoint, Access, and the Internet
- ◆ Administering exams electronically
- ◆ Evaluating student progress through electronically submitted lab exercises and exams

Education:

- ◆ Currently enrolled in on-line MSCE training
- ◆ Currently working towards certification of 'On-line Instructor', LERN Foundation
- ◆ M. A. Computer Science, May 1998, University of South Dakota, Vermillion, SD
- ◆ B. S. Allied Health, December 1995

Professional Organizations:

- ◆ Little Priest Tribal College Chapter of A.I.B.L (American Indian Business Leaders)
 - Student Advisor – Fall 2000 to present
- ◆ University of South Dakota Chapter of Association for Computing Machinery (ACM)
 - Secretary/Treasurer, 1997
 - Vice President, 1996
 - Membership, 1995 – 1998

Awards and Honors:

- ◆ Spirit of Metro Team Award (for work on Mayan Connection grant), 2003
- ◆ Graduate Scholastic Achievement Award, 1998
- ◆ Computer Science Department Distinguished Service Award, 1998
- ◆ Outstanding Teaching Assistant Award, 1997
- ◆ ACM Chapter Service Award, 1997
- ◆ ACM Chapter Service Award, 1996
- ◆ Undergraduate Scholastic Achievement Award, 1995
- ◆ Computer Science Distinguished Service Award, 1995